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(202) 663-8007

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May 5, 1994

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

JILL A. STERN
(202) 663-8380

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

Re: CC Docket No. 92-166

Dear Mr. Caton:

On behalf of Ellipsat Corporation I am transmitting herewith an original and five copies of its comments with respect to the Notice of Proposed Rulemaking in the above-referenced proceeding.

Should there be any questions concerning this matter, kindly communicate with the undersigned.

Sincerely,

Jill Abeshouse Stern

Jill Abeshouse Stern

JAS:pad

Enclosures

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ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands	)	CC Docket No. 92-166

COMMENTS OF ELLIPSAT CORPORATION

Jill Abeshouse Stern
Jane M. Sullivan

SHAW, PITTMAN, POTTS & TROWBRIDGE
2300 N Street, N.W.
Washington, D.C. 20037
(202) 663-8000

Counsel to Ellipsat Corporation

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2300 N Street, N.W.
Washington, D.C. 20037
(202) 663-8000

Counsel to Ellipsat Corporation

May 5, 1994

TABLE OF CONTENTS

EXHIBITS

SUMMARY

Ellipsat Corporation supports the Commission's efforts to establish a flexible regulatory framework for MSS Above 1 GHz that accommodates all of the Big LEO systems and facilitates provision of the new and publicly beneficial communications services that they will provide in the U.S. and worldwide. The spectrum sharing plan proposed in the Notice -- 11.35 MHz of L-Band spectrum for the four CDMA systems and 5.15 MHz for the FDMA/TDMA system -- will expedite service to the public, by avoiding protracted and costly regulatory proceedings and providing the certainty needed for system design and financing. For this reason, Ellipsat endorses the proposed sharing plan (subject to certain caveats below), and urges the Commission to move forward expeditiously with adoption of appropriate rules and licensing of the LEO systems.

While the sharing plan concept is workable, its acceptability is conditioned on satisfactory resolution of the following key issues.

GLONASS Relocation. The Commission must acknowledge and make provision for GLONASS operation in the 1610-1616 MHz band. Unless GLONASS is relocated below 1610 MHz, the available spectrum will be severely restricted and an interim or transitional spectrum plan may be needed. Ellipsat urges the Commission to define an interim plan along the lines proposed in

the Notice or to establish an equitable and enforceable mechanism for sharing the burden, until GLONASS is relocated.

Intra-Service Coordination. The acceptability of the sharing plan depends upon intra-service coordination among the CDMA applicants (and assumes that no applicant will be allowed to change its proposed access technique.) Full-band sharing by the CDMA systems is feasible, but will require establishment of an industry coordinating group and baseline parameters.

Feeder Link Spectrum. The Commission must continue to seek feeder link spectrum below 15 GHz. The use of Ka-band spectrum is highly problematic from a technical, service and financial standpoint, imposing an unfair burden on systems that use multiple ground switching networks. Ellipsat estimates that 500 MHz of spectrum, in both directions, will be required for LEO feeder links and is prepared to assist the Commission in identifying appropriate spectrum.

Non-geostationary Orbits. The spectrum must be limited to systems using non-geostationary orbits. All parties agree that coordination between non-geostationary and LEO satellites will be difficult and will, at best, cause severe capacity limitations. These frequencies are the only spectrum now available exclusively for LEOs (in contrast to GSO MSS) and the need to facilitate sharing of the limited spectrum is a compelling reason for excluding GSO systems. The LEOs are inherently global systems that will offer new and innovative services in the U.S. and

worldwide. Limiting the band to systems using non-geostationary orbits will facilitate introduction of publicly beneficial LEO services, not otherwise available.

S-Band Downlink Spectrum. The Commission must ensure that the CDMA systems have full use of the S-band spectrum for downlinks.

Limitation on Bi-Directional Operation. Bi-directional operation of the FDMA/TDMA system must be limited to spectrum assigned for that access technique. Through an apparent oversight, this is not clearly stated in the Notice.

Reassignment of Unused FDMA/TDMA Spectrum. The Commission must provide CDMA systems with an equal opportunity to use under-utilized FDMA/TDMA spectrum. This is not presently the case.

Adoption of Qualification Standards That Accommodate Diverse Market/Technical Approaches. The Commission should not adopt qualification rules that mandate a particular market/technical approach. While the ELLIPSO™ system can and will meet whatever standards are adopted, from a policy standpoint the Commission should provide maximum flexibility to applicants in structuring their business plans and system design to attract financing and to meet market demand. LEOs are a new and commercially unproven service and the marketplace will provide the best determinant of success. As discussed herein, the proposed ELLIPSO™ system has a unique and valuable option of providing commercially viable

service (i.e., 24-hour coverage to 50% of the world's population) with only eight satellites and growing to meet demand. The Commission should not penalize this innovative and efficient approach to service implementation.

Financial Standards. The proposed financial standards are inconsistent with prior Commission precedent, unrealistic in the context of a new satellite service, and discriminate impermissibly between entrants (which are often small businesses) with the service under consideration as the main line of business, and other companies (often large) with other lines of business. To the extent that other companies with multiple lines of business may submit a balance sheet or financial statement as evidence of qualification (evidence which Ellipsat submits has questionable probative value without a management commitment to fund the project), new entrants should be allowed to rely also upon the assets and operating income of their strategic partners to demonstrate ability to proceed.

In these comments, Ellipsat suggests several options that are consistent with FCC precedent and which allow flexibility for different market/technical approaches, while ensuring the Commission's objective of expeditious system implementation will be met. These options would allow financial qualifications to be shown on the basis of: (1) ability to construct, launch and operate a portion of the system providing commercial service; (2) projected revenues and income, and future public offerings

(debt and equity); and/or (3) compliance with strict milestone requirements (i.e., implementation of commercial service within four years) in lieu of stringent financial standards.

Coverage Requirements. With respect to technical qualifications, Ellipsat agrees with the Commission that global and U.S. coverage requirements are appropriate. However, it proposes certain modifications to ensure that the standards meet the Commission's objective of ensuring genuine quality service to populated areas and especially the U.S. For example, the Commission should require a 15° elevation angle standard for global coverage between 55° southern latitude and 75° northern latitude; and a 24-hour 25° elevation angle in the U.S.

Service Rules. Ellipsat generally supports the proposed service rules, but recommends that (1) the Commission exercise its discretion not to regulate satellite licenses as common carriers (unless service is provided directly to the public); (2) allow liberal technical modifications of satellites within the license term to facilitate technological advances; and (3) adopt milestones that provide flexibility for progressive deployment in order to accommodate different market approaches.

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COMMENTS OF ELLIPSAT CORPORATION

Ellipsat Corporation ("Ellipsat"), by its attorneys, hereby submits its comments with respect to the Notice of Proposed Rulemaking (the "Notice") in the above-captioned proceeding, in which the Commission proposes rules and policies governing the Mobile Satellite Service ("MSS") Above 1 GHz.[1/]

I. INTRODUCTION AND SUMMARY

Ellipsat expresses its appreciation to the Commission for its efforts, in this proceeding, to establish a regulatory framework for MSS Above 1 GHz that will facilitate introduction of this new and publicly beneficial global satellite service. The subject Notice represents the culmination of numerous domestic and international proceedings spanning nearly four years -- initiated by the filing in November 1990 of Ellipsat's

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1/ Notice of Proposed Rulemaking, CC Docket No. 92-166, 9 FCC Rcd 1094, released February 18, 1994.

application to construct an elliptical low-Earth orbit (LEO) satellite system using frequencies in the 1610-1626.5 MHz and 2483.5-2500 MHz bands to provide mobile voice and data services.[2/]

The Notice proposes a workable solution to the central issue facing the Commission in this proceeding, namely, how to accommodate all of the proposed systems in the available spectrum. Although Ellipsat initially advocated a full-band sharing approach, it is willing to support the spectrum sharing plan proposed in the Notice in the interests of expediting service to the public and avoiding the protracted and costly proceedings that will otherwise be necessary if mutual exclusivity is not resolved.

Under the Notice's approach, specific frequencies are set aside for different access techniques. CDMA systems and FDMA/TDMA systems will be assigned 11.35 MHz and 5.15 MHz of spectrum, respectively. Provided the entire spectrum is unencumbered, the Commission's approach allows up to five LEO systems to initiate service and to begin meeting the marketplace challenges ahead.

2/ The history of this proceeding has been detailed in the Notice and need not be repeated here. It is sufficient to note that previous related proceedings included WARC-92, which resulted in allocation of spectrum for the Big LEOs and established international coordination procedures, domestic MSS allocation proceedings (Report and Order, ET Docket No. 92-28, 9 FCC Rcd 536, released January 12, 1994), and a 1993 negotiated rulemaking process.

Adoption of the Commission's sharing proposal will permit timely implementation of LEO services and provide substantial public benefits, within the U.S. and worldwide. The Commission should move forward expeditiously with adoption of the proposed sharing plan and licensing of the LEO systems, subject to the conditions discussed below.

Although Ellipsat generally endorses the proposed spectrum sharing plan, there are a number of prerequisites which are fundamental to successful and equitable implementation of the proposed scheme. The most critical conditions are summarized below. These and other issues that must be addressed are detailed in the text of these comments.

First, the spectrum sharing plan must acknowledge that GLONASS operation in the 1610-1616 MHz band will compromise the ability of CDMA systems to use the portion of the band assigned for that technique. Unless GLONASS moves below 1610 MHz to 1606 MHz, the spectrum assigned for CDMA systems will not be able to accommodate the four CDMA systems and, to avoid unfair competitive advantage, the FDMA/TDMA band will also have to be seriously constricted.

The Commission should deal with this issue by conditioning licenses on resolution of the GLONASS issue. In addition, the Commission should (1) specify an interim plan such as the one proposed by the FCC in the Notice; or (2) provide a mechanism for sharing the burden, if GLONASS is not relocated below 1610 MHz

within the relevant time frame, together with the standards which should be employed (e.g., proportionality).

Second, limitation of the 1610-1626.5 MHz frequency band to non-geostationary systems, as the Commission proposes, is a valid eligibility criterion. LEO systems will provide innovative and inherently global services, not currently available or proposed, including cost-effective mobile voice and data services to hand-held and vehicular phones and position location. Sharing between LEO and geostationary orbit (GSO) systems will be difficult and will compromise the ability of LEO applicants to implement their proposed systems in the limited spectrum. This is the only frequency band currently available for LEO MSS systems, in contrast to the availability of a wide range of frequencies for GSO MSS systems. The Commission should therefore facilitate provision of the new and publicly beneficial services that LEOs will offer, by establishing non-geostationary orbits as a threshold condition.

Third, the Commission must place a high priority on identifying feeder link spectrum for the CDMA systems below 15 GHz and allowing for full S-band use for CDMA downlinks. Preliminary analysis by Ellipsat indicates that the use of Ka-band frequencies for feeder links will be prohibitively expensive, is problematic from a technical and service standpoint, and is already subject to competing claims by terrestrial and satellite services. In addition, required use of

the Ka-band for feeder links could unfairly penalize systems that use multiple ground switching networks. Ellipsat will require 500 MHz of spectrum in each direction for feeder links (assuming sharing with other LEO systems.)

While Ellipsat intends to participate in the Ka-band negotiated rulemaking, it urges the Commission to continue its efforts to find suitable spectrum in the Ku and/or C-bands for MSS feeder links and to seek a clarification of coordination standards for LEO feeder links that will allow the proposed operations. Ellipsat, MCHI, and its strategic partners are prepared to assist the FCC in such efforts.

Fourth, intra-service sharing between CDMA systems is a basic condition. The CDMA systems confirmed the feasibility of sharing during the negotiated rulemaking process. Intra-service coordination should be required and an industry coordination committee should be established to develop technical sharing parameters. Ellipsat encourages the Commission to adopt baseline parameters to avoid delays in initiating service.

In addition to commenting on the sharing plan, Ellipsat offers its comments with respect to the proposed qualification standards and service rules. In general, Ellipsat's position is that the Commission should avoid adopting technical and other criteria that could limit the flexibility of LEO MSS -- a new and commercially unproven service -- from responding to the marketplace. A number of the Commission's proposed rules can be

read either as requiring a particular approach to the market (which will remain speculative until systems are in a position to sell their services) or, as in its rules for financial qualifications, as effectively precluding an open market approach. Indeed, these rules will put the Commission in the inappropriate position of dictating what services will meet market needs, instead of allowing those determinations to be made by the marketplace. Ellipsat questions the need for overly stringent rules of questionable relevance that will potentially embroil the Commission in second-guessing the market strategy, system designs and ownership structure of system operators who are willing to put their money and technology at risk.

Ellipsat's specific comments can be summarized as follows:

Coverage. Ellipsat agrees with the Commission that global and U.S. coverage requirements are appropriate. In order to ensure that genuine quality service will be provided to populated areas of the world (excluding polar regions), if the Commission decides to adopt an elevation angle standard (which Ellipsat suggests may not be advisable), that standard should be 15° elevation angle for global coverage between 55° southern latitude and 75° northern latitude, and 25° elevation angle for U.S. coverage. In fact, studies of the relationship between the "fading margins and the elevation angles show significant improvement of service quality in relation to elevation angle.

This quality standard should strongly be recommended for U.S. service.[3/]

Financial. Whatever technical and financial standards may be adopted, the ELLIPSO™ system can and will be qualified.[4/] However, the proposed financial standards are inconsistent with prior Commission precedent, unnecessary where all systems can be accommodated and could penalize innovative technical/market approaches that offer substantial public benefits. Indeed, the public will ultimately suffer if it is denied the opportunity to select among competitive systems and services. As discussed herein, the ELLIPSO™ system has a unique and valuable option to introduce commercial service through progressive deployment of satellites. This innovative market and technical approach, which allows ELLIPSO™ to provide 24-hour coverage to 50% of the world's population with only eight satellites, should be encouraged by the Commission.

In order to meet the Commission's objective of ensuring expeditious system implementation, consistent with prior Commission and court decisions, Ellipsat proposes three options: (1) financial ability to construct, launch and operate a portion of the system that will provide commercial service; (2) financial

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3/ Wilhelm Milcz, "Some Communications Aspects of Satellite Systems Using Highly Inclined Orbits," Elsevier Space Communications No. 7(1990) at 355-363 and other works.

4/ See, e.g., Declaration of Davinder Sethi and Letter from Barclays de Zoete Wedd, Exhibit A hereto.

preparedness, based on various sources of funding including projected revenues and income and public offerings; and/or (3) a strict milestone requiring introduction of commercial service within four years.

Service Rules. The Commission should adopt service rules that allow for system upgrades during the license term, discretion for satellite licenses to operate as non-common carriers, and accommodate diverse market strategies such as progressive deployment in the milestone schedules.

II.
BACKGROUND AND OVERVIEW OF ELLIPSO™ SYSTEM

On November 5, 1990, Ellipsat was the first to file an application seeking authority to provide mobile voice services using low-earth orbiting satellites operating in the 1610-1626.5 MHz (uplink) and 2483.5-2500 MHz (downlink) bands.[5/] In its

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5/ Ellipsat's November 5, 1990 application was filed in response to the FCC's September 4, 1990 Public Notice accepting the Geostar modification application for filing. Public Notice, Report No. DS-999, 5 FCC Rcd 5400, released September 4, 1990. To date, the Commission has never directly ruled on Ellipsat's position that its November 1990 application was entitled to be considered in the processing window created by Geostar's filing. The Commission did, in fact, later characterize Geostar's modification application as a new system application because the proposed modifications were so extensive. See Memorandum Opinion and Order, 6 F.C.C. Rcd 2276 (1991).

Ellipsat's May 31, 1991 Petition for Partial Reconsideration of the Geostar decision is still pending and must be resolved in order to clarify whether Ellipsat is entitled to

Footnote continued on next page.

November 1990 application, Ellipsat proposed a twenty-four satellite ELLIPSO™ system and requested authority to construct an initial entry system consisting of six satellites (ELLIPSO™ I), in order to access the market rapidly. On June 3, 1991, Ellipsat filed its second application with the Commission, requesting authority to construct the eighteen additional satellites needed to complete the ELLIPSO™ constellation.

Fundamental to the ELLIPSO™ approach, in 1990 and today, and inherent in the design of its orbits, is the concept of progressive deployment and growing to meet demand. While others may have to deploy all their satellites before being able fully to serve their first customer, the ELLIPSO™ system is designed to introduce commercially viable, 24-hour service, in stages by region.[6/] ELLIPSO™'s market strategy, made possible by a unique technical approach, has been favorably received by the financial and user communities, and is a critical foundation of the

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Footnote continued from previous page.

be processed in a separate processing group, in advance of the other LEO applicants. Ellipsat's support for the proposed sharing plan is contingent on the disposition of its petition.

6/ With eight satellites in elliptical orbits, for example, ELLIPSO™ will be able to provide 24-hour coverage to more than 50% of the world's population. For further discussion of the benefits of ELLIPSO™'s progressive deployment approach, see pages 39 below and Exhibit A.

ELLIPSO™ vision.[7/] This vision has been endorsed by the strategic partners who have joined the ELLIPSO™ team, including Harris Corporation, Westinghouse Electric Corporation, Fairchild Space and the InterDigital Corporation, and by service providers in a number of countries who have contracted to distribute ELLIPSO™ services.

ELLIPSO™'s progressive deployment approach minimizes initial capacity requirements and provides flexibility to meet market demand. It conserves and lessens the cost of capital. These features result in lower costs to the public.[8/] In Ellipsat's view, this approach is the only sensible plan for introducing a new and commercially unproven service, a view which is shared by Barclays Bank, ELLIPSO™'s financial advisor.[9/]

The ELLIPSO™ system is designed to permit multiple entry by U.S. and international systems in the subject frequency bands. Following the filing of applications by Motorola, TRW, Loral Qualcomm and Constellation, Ellipsat has refined its system design to maximize channel capacity in a sharing environment to

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7/ Elliptical orbits are a unique technical feature of the ELLIPSO™ system, and provide significant market advantages. Among other benefits, elliptical orbits minimize the number of satellites required, by focusing resources where there is market demand. Elliptical orbits also allow maximum power to be focused during peak usage times anywhere in the world and thereby minimize initial capacity requirements.

8/ The ELLIPSO™ system will operate profitably at just over 300,000 subscribers worldwide while providing services at end-user prices under 50 cents per minute.

9/ See Declaration of Davinder Sethi (Exhibit A).

accommodate multiple system operators and to meet demand for ELLIPSO™ services. These system refinements were discussed in great detail during the 1993 negotiated rulemaking, in which Ellipsat actively participated.

The ELLIPSO™ system will be fully capable of providing global service. It does so through two complementary and coordinated elliptical sub-constellations, inclined and equatorial. The northern inclined orbiting satellites, referred to as the Borealist constellation, primarily serve areas in the Northern temperate latitudes, while the equatorial orbit constellation, called Concordia™, serves areas in the tropical and Southern latitudes.[10/] Each orbital configuration has been carefully designed to complement the other so that, in combination, they offer an effective and efficient solution to worldwide coverage.[11/] ELLIPSO™ can adjust deployment schedule and capacity to tailor global coverage to meet market demand.

The potential markets served by the ELLIPSO™ system include mobile voice and data services through vehicular and hand-held

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10/ ELLIPSO™ introduces these features with the same number of satellites previously applied for, or fewer. Although referred to as "constellations" for marketing purposes, Concordia and Borealis are actually orbital configurations. Full details will be submitted with Ellipsat's conforming amendment after new rules are adopted.

11/ In this regard, the Notice erroneously implies that elliptical orbits are unable to provide global coverage. See Notice at ¶ 23; id. at n. 49. To the contrary, as discussed below in note 33, global coverage can be readily achieved merely by adding satellites or adjusting orbital configuration.

phones, rural telephony and position location. In contrast to the U.S., where the primary use will be to supplement terrestrial cellular service, ELLIPSO™ services offer the potential to provide basic telephone service in the developing world as a step toward establishing an advanced communications infrastructure. ELLIPSO™ is designed to meet telecommunications and information needs in both industrialized and developing nations.

Since Ellipsat filed its application in 1990, Mobile Communications Holdings, Inc. (MCHI), its parent company, has been moving forward vigorously with implementation of the ELLIPSO™ system. MCHI has assembled a highly-qualified team of technical and marketing personnel, as reflected in the resumes of key employees attached as Exhibit B.

ELLIPSO™ has also finalized the technical and financial "infrastructure" needed for rapid system deployment. Barclays de Zoete Wedd, the investment banking arm of Barclays Bank (with #160 billion in assets), serves as the company's financial advisor and assists with system financing, international initiatives and strategic partnerships.

MCHI has formed strategic partnerships with Fairchild Space, Westinghouse Electric Corporation, Harris Corporation, InterDigital Corporation and Israel Aircraft Industries, among others. These relationships include equity investments and/or substantial financial and technology commitments. Fairchild Space is the prime contractor for the space segment. Harris is

developing the satellite communications payload. Westinghouse is the strategic partner for development of the ground segment, including ground control stations and connectivity to the PSTN. InterDigital is developing the dual mode terminal technology.

In addition to these equipment suppliers, MCHI is also working closely on behalf of ELLIPSOt, with potential service providers in the U.S. and in other countries, and has agreements with companies in Russia, Israel, Australia, South America, Canada and the Pacific Rim.

III.
ELLIPSAT GENERALLY SUPPORTS THE PROPOSED SHARING PLAN

In the Notice, the Commission proposes a spectrum sharing plan which, in its view, will accommodate up to five LEO systems. A key feature of this plan is the set-aside of spectrum for different access techniques. CDMA systems will be assigned 11.35 MHz at 1610-1621.35 MHz; FDMA/TDMA systems will be assigned 5.15 MHz at 1621.35-1626.5 MHz. When a system is launched and ready to begin operating, it will be permitted to operate over the entire bandwidth assigned for that technology.

Ellipsat generally endorses the sharing plan and commends the Commission for identifying an equitable solution. The proposed plan will allow each of the five LEO applicants to move forward with its business plans. This certainty is critical for system design and sends an important message to the financial

community and others who are making business decisions involving the LEO systems.[12/]

In Ellipsat's view, it is critical to avoid the uncertainty of a lottery, auction or comparative hearing. The devastating impact of these alternatives, in terms of delay and expense, could sound the "death-knell" for LEO services and could foreclose the public's ability to select among diverse and competing systems. Given the need for international licensing and coordination of the LEO systems, auctions could have a disastrous effect on international implementation. In addition, Congress has encouraged the Commission to resolve mutual exclusivity through other means before turning to auctions.[13/]

The proposed sharing plan avoids mutual exclusivity, consistent with the Commission's public interest obligation, and therefore obviates the need for auctions, lotteries or comparative hearings. If the Commission should ultimately adopt an auction, however, Ellipsat strongly recommends that spectrum

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12/ Satellite manufacturers, equipment providers and other companies are making business decisions, involving commitments of substantial resources, to the LEO business. These companies need the certainty provided by a spectrum plan that provides each LEO company with the opportunity to, at least, get started.

13/ See 47 U.S.C. § 309(j)(6)(E) which preserves the Commission's public interest obligation "to continue to use engineering solutions, negotiation, threshold qualifications, service regulations, and other means in order to avoid mutual exclusivity."

be set aside for small businesses, consistent with Congressional intent.[14/]

Although Ellipsat initially endorsed a full-band sharing approach, it can work within the parameters of the proposed sharing plan and is willing to do so in order to expedite system licensing. However, its support for the sharing plan is contingent upon satisfactory resolution of the important issues discussed below.[15/]

A. GLONASS Must Be Moved Below 1610 MHz

The Commission's sharing plan is acceptable only if GLONASS is ultimately moved below 1610 MHz. Interference problems between the LEO MSS systems and GLONASS will potentially preclude use of the 1610-1616 MHz band for LEO services. While the Commission expresses the hope that GLONASS will eventually be moved to frequency bands below 1610 MHz, there is no assurance that this will occur (or occur in a timely fashion.) As a result, the spectrum allocated to the Big LEO systems is heavily constricted at the expense of both CDMA and FDMA/TDMA systems.

14/ See 47 U.S.C. § 309(j)(4)(D). ("In prescribing regulations ... the Commission shall ... ensure that small businesses ... are given the opportunity to participate.") In the narrowband PCS proceeding (PP Docket No. 93-253), the Commission will allow small businesses to pay for licenses in installments over the term of the license. FCC News Release, Report No. DC-2590, April 20, 1994.

15/ Ellipsat's support also assumes that none of the pending applicants will be permitted to change access technique.